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Joint Aspiration: Arthrocentesis

SUMMARY

Joint aspiration is an easily mastered procedure used to confirm or rule out joint sepsis and crystal-induced arthrosis. It is routinely performed with or without local anaesthetic, or with cooling spray. The time spent obtaining the fluid is short. The procedure is safe, requiring no hospitalization, except in the case of diagnosed sepsis.

Arthrocentesis is a necessary procedure to prove beyond reasonable doubt that infection is not the cause of the arthritis. The family physician must be familiar with this procedure and obtain fluid for analysis, or refer when joint fluid cannot be readily aspirated. (*Can Fam Physician* 1987; 33:2057–2062.)

RÉSUMÉ

La ponction articulaire est une technique facilement maîtrisée permettant de confirmer ou d'infirmar une arthrite septique ou une arthrose secondaire à la présence de cristaux. Elle se pratique routinièrement sous anesthésie locale ou en se servant d'un anesthésique par réfrigération. L'obtention du liquide se fait rapidement et la procédure est sécuritaire, ne nécessitant aucune hospitalisation sauf dans les cas où l'on pose le diagnostic d'arthrite septique. Il est nécessaire de procéder à une arthrocentèse pour prouver hors de tout doute raisonnable qu'il ne s'agit pas d'une arthrite infectieuse. Le médecin de famille doit donc être familier avec cette technique d'aspiration de liquide pour fin d'analyse, ou référer en cas de difficulté technique.

Key words: arthrocentesis, joint aspiration, rheumatology

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MOST JOINTS in the body can be punctured to remove synovial fluid, in order to gain required information. The most common cause for

aspiration is the red, painful, swollen joint with a limited range of motion. Joint aspiration followed by synovial fluid analysis remains the most accurate test for positive diagnosis in rheumatology.

Even though there are highly potent antibiotics, septic arthritis remains a very serious problem. Suspicion of possible infection and awareness of appropriate early management are necessary for successful outcome if rapid joint destruction is to be prevented.

History and Physical Examination

Although laboratory and diagnostic tests are becoming more sophisticated, careful history and physical examination are essential before proceeding to joint aspiration. The history must

focus on the patient's age, previous systemic diseases and symptoms, their duration and reaction to medications, drug and alcohol use, and previous joint damage by trauma, disease, or surgery (prothesis) in this or other joints. The physical examination must assess joint inflammation, range of motion, tenosynovitis, concurrent infections, skin rashes or lesions, signs of systemic illness and infection, and previous trauma or surgery. Laboratory tests, of which the most valuable is joint aspiration, have both diagnostic and therapeutic value. Orthopedic, radiologic or rheumatologic consultation may be required if there is difficulty obtaining fluid.

Synovial fluid analysis should include total leukocyte count and differential, synovial fluid glucose, gram

stain, cultures and special stains, countercurrent immunoelectrophoresis (CIE), and crystal examination.

Blood cultures, erythrocyte sedimentation rate (ESR), and cultures from other infected sites should be done, and X-rays are needed to assess the inflamed, possibly infected, joint. Radioisotope scans may be superior to X-ray in certain joints (S.I.). However joint aspiration is required to establish the presence of infection.

The Procedure

Joint aspiration, like arthroscopy, is a surgical procedure. It is important that sterile procedure be followed.

Explanation is given, and informed consent obtained. Hands are washed, and the injection site is scrubbed with surgical soap. Povidone-iodine solution is then applied. Surgical gloves and sterile drapes can be used and may be indicated for hip aspiration. Needles and injection supplies are kept sterile and handled with care after injection. If local anesthesia is used, check history for adverse reaction, and consider the possibility of need for resuscitation. Ethyl chloride spray can be used. Always use a new bottle of 1% plain lidocaine with a fine needle. Inject along the needle track back to the skin. Remember that lidocaine in a

joint may interfere with culture. A 22-gauge needle is commonly used for aspiration of larger joints, but # 18 may be required if clotting occurs. A 5mL–10mL syringe is usually adequate to remove as much fluid as possible, but for massive effusions vacuum suction can be used effectively.¹ For smaller joints, a 25-gauge 5/8" needle on a 2mL–3mL syringe works well.

The joint aspirate is collected in the syringe. Five to 10 drops must be left for stat gram stain, culture, and sensitivity. The remainder of the fluid is injected into the various tubes for analysis. One-half mL is required by haematology for cell count and differential, which is sent in an EDTA (purple top tube in our hospitals). The EDTA maintains the integrity of the cells, but interferes with crystal identification. Counter current immunoelectrophoresis (CIE) detects bacterial antigens when joint fluid is sterile.

For crystal identification, a heparin (green) or plain glass (red) tube is used. If the aspirate is blood tinged, the green tube is preferable, as crystals are lost in the clot. One mL of fluid is required.

Glucose is measured by chemistry when sent in a fluoride (grey) tube. One-half mL is required. The fluoride is a preservative that stops breakdown of glucose.

Total protein estimate requires ½ mL minimum to be sent in the tube (red top, plain glass).

The remaining fluid is sent to microbiology in the capped syringe. A gram stain requires 1 drop of fluid, and results are obtained in 15–30 minutes. The remaining fluid, four drops or more, is plated and reported in 48 hours. Cultures are held for five days, but if fungus or tuberculosis are ordered, they are grown for two or 10 weeks respectively. The specimen is also plated on Martin-Lewis medium to detect gonococcal infection. Anaerobes are plated on anaerobic medium.

Sites

Knee

The most common joint to require arthrocentesis and the largest synovial joint in the body is the knee. It is the easiest to aspirate, particularly if there is a large effusion. The patient lies supine, and the knee is extended as far as

possible. Support of a pillow or folded sheet may help if the knee cannot fully extend. The quadriceps are relaxed. The anteromedial knee joint is prepared as described above. Local anesthesia can be used, but some experienced practitioners choose not to use it. The location chosen is the medial side of the patella, one-third of the way down from the upper pole. The patella is tipped, and a needle is inserted under it (Figure 1). A small amount of air, 1mL–2mL, is left in the syringe as it enters the joint. An attempt is made to aspirate fluid. If the needle becomes plugged, air can be pushed in. As much fluid as possible is removed. The fluid is observed grossly. Normally, fluid is clear enough to read through. The fluid is sent to the lab for further tests as described. If steroid is to be instilled, it should be drawn up in a separate syringe and set aside until needed. After aspiration the needle hub is grasped with a hemostat, and the aspirating syringe is replaced with the injecting syringe. Steroid is injected slowly, and the needle is removed. Pressure is applied with sterile gauze, and a band-aid dressing is applied.

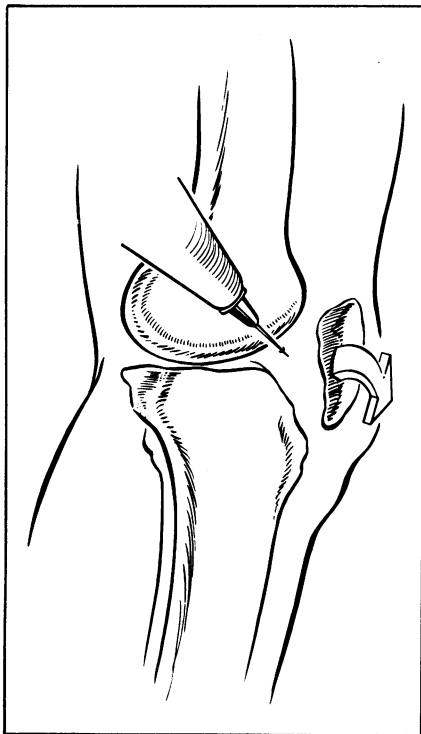
The patient should be warned that within the first 24–36 hours there may be a flare up of inflammation caused by steroid crystals. An ice-pack is recommended, and analgesia may be required. The patient should also be warned to watch for signs of sepsis. Increased swelling, pain, redness, and heat may occur. If they do occur, the patient should contact the physician promptly. It is wise to ensure further contact with the patient within 24 hours.

Hip aspiration

In most circumstances hip aspiration is performed by an orthopedist, rheumatologist or radiologist. It is required for many conditions in the pediatric age group. The approach can be superior, lateral, or anterior. Care must be exercised not to damage any of the surrounding blood vessels. The patient is put in a reclining position with the hip in maximal extension and internal rotation. A 2½-inch 20-gauge needle is used for anterior approach; a 3-inch needle for lateral. The site is prepared and anesthetized as above.

Anterior approach. Radiologists are skilled at this approach. The needle is

Figure 1
Medial Approach to the Knee



2cm–3cm distal to the anterior superior iliac spine and 2cm–3cm lateral to femoral pulse, and is inserted at an angle of 60° to the skin, pointing posteromedial through the capsular ligament until bone is reached. The tip of needle is withdrawn slightly. The fluid can then be aspirated.

Lateral approach. The needle is inserted at the anterior edge of the greater trochanter and follows the periosteum to the hip joint, pointing to the midpoint of the inguinal ligament. When the needle tip enters the joint space, the negative pressure on the syringe draws fluid into the needle.

The “waggle sign” is produced in the anterior approach.² This is the paradoxical movement of the needle hub that is produced on internal and external rotation when the tip has penetrated the hip capsule: that is, when the leg is rotated externally, the needle hub rotates internally. If positioning of the needle is in question, verification can be obtained from X-ray.

First metatarsophalangeal joint

This is a common location for acute inflammation from gout or sepsis, or chronic inflammation from osteoarthritis or bunion formation. The skin is prepared as above, with scrub and iodine application. A skin wheal with 1% plain lidocaine is made. A fine needle (25-gauge) offers best access to

these small joints. If the location of the joint is obscured by swelling, fluid can be obtained by checking the other foot. The approach is from the medial side, avoiding tendons and neurovascular structure, at the depression between the two bones. The joint is distracted, with 15° flexion and the needle inserted straight in. A small amount of fluid, as little as a drop, is aspirated and steroid of choice can be injected slowly. The needle is withdrawn, and band-aid type dressing is applied.

Finger joints

In the finger joints, degenerative arthritis is more likely to cause inflammation than is infection, but the search for crystals and sepsis are indications for arthrocentesis. If the joint is swollen, it is usually possible to enter dorsomedially or dorsolaterally. The physician can massage fluid to the opposite side, then insert the needle where the fluid is. If the joint is not swollen, it may be difficult to enter. The skin is prepared as described above. A 25-gauge needle is used to aspirate, and a small amount of steroid may be injected.

Shoulder

The shoulder is scrubbed and anesthetized as described above. If the fluid is anterior, it is aspirated anteriorly by inserting the needle just

medial to the head of the humerus and 1 cm lateral to the coracoid process (Figure 2). Injury to the thoracoacromial artery is avoided by staying lateral to the coracoid process. The posterior approach to the shoulder is used for diffuse inflammation. The tip of the needle is inserted 1 cm medially and 1½ cm inferiorly to the tip of the acromion. The physician should aim anteromedially to the jugular notch (Figure 3).

Elbow

The needle is directed anteromedially between the lateral epicondyle of the humerus and the olecranon process of the ulna into the joint capsule (Figure 5).

Wrist

The dorsal approach is free of important nerves and vessels. The site is prepared as above. A depression on the back of the wrist on the ulnar side of the extensor pollicus tendon is palpated with the wrist in neutral position or slightly flexed. The joint space opens, and the needle is easily inserted to 1cm–2cm depth, moving freely within the joint (Figure 5).

Ankle

The anteromedial approach is used. The site is prepared as above. The hollow between the medial malleolus and the extensor hallucis is palpated. The

Figure 2
Anterior Approach to the Shoulder

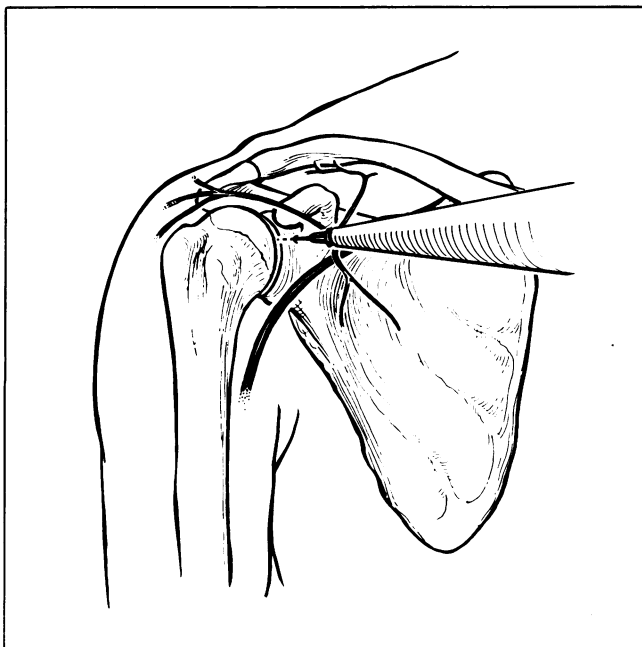
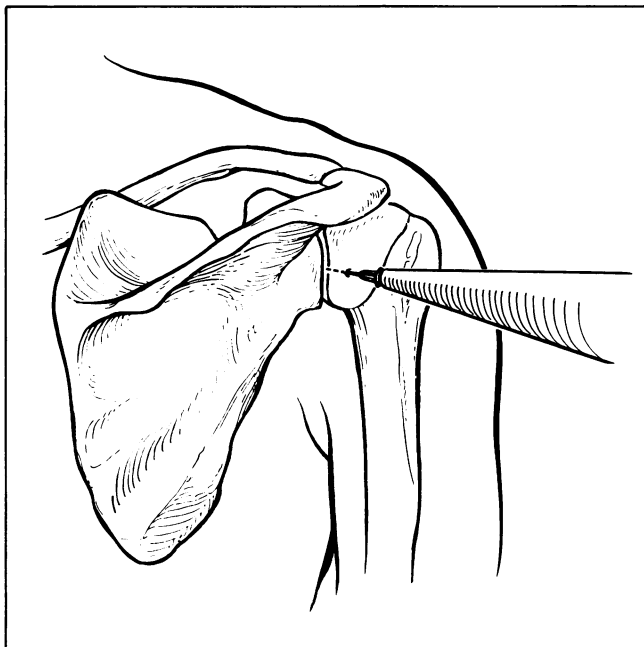


Figure 3
Posterior Approach to the Shoulder



needle should be aimed toward the middle of the tibiotalar joint to a depth of 1cm–3cm and should move freely in the joint (Figure 6).

Prior to aspiration, of any joint there are a number of questions that must be answered: Is the joint problem monoarticular or polyarticular? Is the joint problem acute (of less than 14 days duration) or chronic? Is it traumatic or non-traumatic? Is the problem periarticular rather than articular? (see Table 1.)

Contraindications to the procedure include presence of intervening infected tissue or evidence of a serious clotting disorder. The needle should not be placed through infected tissue into joints. The orthopedic surgeon who has inserted a joint prosthesis should be the one to do subsequent aspirations of that joint.

Causes of Joint Swelling

Post-traumatic monoarticular joint injury. This condition, with effusion, requires orthopedic evaluation when there is:

- joint instability;
- intra-articular fracture or loose bodies;
- marked limitation of range of motion;
- hemarthrosis on needle aspiration (75% of traumatic hemarthrosis of the

knee have a torn anterior cruciate ligament).

If aspiration is done to relieve pressure in a tensely swollen joint, the use of a tensor bandage is advisable to reduce refilling of the space. Circulation distal to the tensor must be monitored.

A traumatic hemarthrosis of any joint needs a thorough orthopedic examination that may reflect an intra-articular fracture or ligamentous tear, both of which are best treated acutely.

In acute monoarthritis, when sepsis and hemarthrosis are ruled out by synovial fluid analysis, the symptoms can be treated with protection, splinting, joint rest, oral anti-inflammatory drugs, ice-packs, or moist heat. Heat is not recommended for recent trauma injury of less than 36–48 hours standing. If infection is considered, and no crystals are seen in the fluid, various options exist for the treatment that can be undertaken while awaiting results of the gram stain and culture. If highly suspicious of infection, the physician can begin antibiotics. If there is a history of gout and crystal arthrosis is strongly suspected, the physician can use anti-inflammatory medications and contact the patient the next day. If the inflamed joint has not shown infection at 48 hours, the physician might add anti-inflammatories. If still suspicious of

infection, he/she might consider synovial biopsy.

Isometric exercises for muscles supporting the joint can begin, and as function improves, larger function exercises should be done.

Idiopathic ANMA. This condition (see Table 2)³ is a diagnosis of exclusion. The prognosis with symptomatic treatment is good for this group.

Sepsis. This cause of acute non-traumatic monoarticular arthritis can destroy a joint rapidly and be life threatening. Every acute monoarticular arthritis must be considered septic until proven otherwise. As with other causes, it presents with swollen, warm, painful, reddened joints with limited range of motion. Arthrocentesis must come to mind unless there is definite evidence to rule out infection. It must be remembered that early infection can have a history of trauma, and that chronic arthritis can become infected.

Joint sepsis is not limited to the adult population. Indeed, it often occurs in neonates. Of pediatric patients, 40% have an associated osteomyelitis.⁴ Infected hips in children are a surgical emergency, as distension and disruption of the joint capsule can destroy the femoral head.

Figure 4
The Elbow

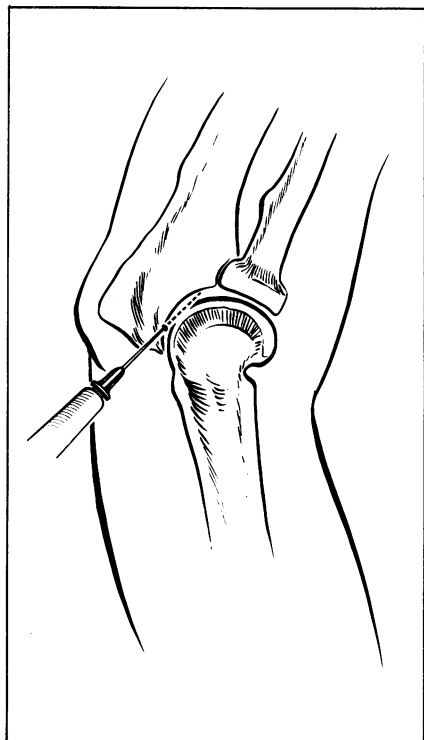


Figure 5
The Wrist

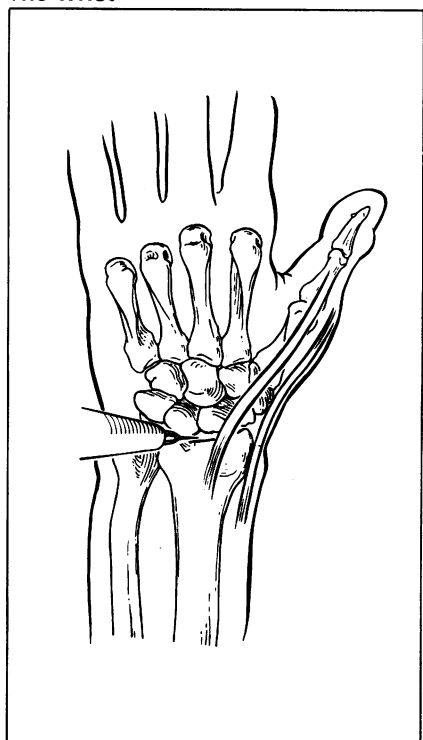
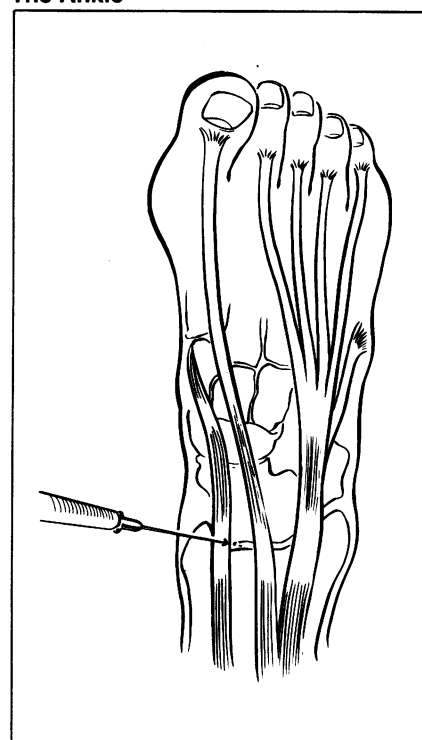


Figure 6
The Ankle



Gonococcal arthritis is a primary diagnosis in previously healthy, young, sexually active adults, and multiple culture sites include joint fluid, cervix, urethra, throat and anus. Blood and joint-fluid cultures may be negative in the monoarticular phase.

Gonococcal arthritis is milder than other forms of septic arthritis, but still demands hospitalization for IV antibiotics and repeat aspiration.

In the adult, septic arthritis is associated with a predisposing condition, such as diabetes, cirrhosis, cancer, pre-existing joint damage, surgery, extra-articular source of infection, use of corticosteroids or immunosuppressant drugs, antibiotics, or IV drug abuse. The child, however, needs no predisposing factors.

Degenerative joint disease. This disease is a frequent cause of ANMA, with its loss of cartilage, osteophyte formation, and non-inflammatory fluid on aspiration. Joints are painful but not hot and swollen. There is usually a history of arthritis, which may involve other joints. The X-ray is diagnostic.

Gout. The patient with gout has joints that are inflamed and exquisitely painful. Gout may occur in the great toe, ankle, or knee of older men and post-menopausal women. Patients relate a positive family history or a history of previous occurrences. Gout may be precipitated by trauma, surgery, ethanol ingestion, dietary excess, or dehydration (diuretic use).

Joint Aspiration as Therapy

Drainage of purulent material may be required after initial diagnostic tap has been performed. This procedure may be repeated on a daily basis as fluid reaccumulates.

Table 1
Causes of Acute Non-traumatic Monoarthritis

Idiopathic ANMA	36%
Sepsis	19%
Degenerative arthritis	17%
Gout	15%
Hemarthrosis	3%
Pseudogout	3%
Miscellaneous	7%

Source: Freed JF, Nies KM, Boyer RS, et al. Acute monoarticular arthritis: A diagnostic approach. *JAMA* 1980; 243:2314-6.

The purpose of joint aspiration is to:

- provide drainage of an enclosed space which is acting functionally as an abscess and therefore requires drainage;
- provide symptomatic relief;
- relieve joint pressure and remove inflammatory products (enzymes that may damage cartilage);
- ensure effectiveness of antibiotic treatment by repeat cultures;
- with gram negative infections, remove pH-lowering debris that reduces antibiotic effectiveness.

Repeated aspiration generally has a more favourable outcome than open drainage in treatment of septic arthritis,⁵ except in the following situations:

- lack of response to appropriate antibiotic therapy and repeated aspirations;
- inability to drain the joint completely by aspiration;
- infection of a prosthetic joint
- inaccessibility of a diseased or necrotic joint, such as infected hip.
- Gram-negative bacillary arthritis seldom gets a good result; it needs

arthrotomy assessment and debridement. The growing use of arthroscopy is having a strong effect on the need for open drainage and debridement.

Overview

Joint aspiration is an easily mastered procedure used to confirm or rule out joint sepsis and crystal-induced arthrosis. It is routinely performed with local anesthetic, cooling spray, or no anesthetic.

The time spent obtaining the fluid is usually five to 15 minutes. The procedure is safe: the rate of induced infection is 1.4:10,000 aspirations in 4,000 individuals.⁶

Joint aspiration is a clinical procedure not requiring hospitalization except in the case of diagnosed sepsis, which requires intravenous antibiotics, serial joint aspiration, or open surgical drainage.

Most patients return home and are able to return to activities, including work, driving and sexual activity, as appropriate to the condition that required the arthrocentesis. The patient should be informed that there may be a

Table 2
Synovial Fluid Analysis

Criteria	Normal	Non-Inflammatory	Inflammatory	Prurulent
Volume (mL) (knee)	<3.5	Often >3.5	Often >3.5	Often >3.5
Color	Clear	Xanthochromic	Xanthochromic to white	Depends on organism
Clarity	Transparent	Transparent	Translucent to opaque	Opaque
Viscosity	High	High	Low	Varies; may be high
Mucin clot	Firm	Firm ^a	Friable	Friable
Spontaneous clot	No	Occasional	Often	Often
Leukocytes (mm ³)	<200	200-2000	2000-100,000 (avg. 20,000)	20,000-200,000 (avg. 100,000)
Polymorphs	<25%	<25%	>75%	>75%
Culture	Negative	Negative	Negative	Positive or negative
Glucose (fasting)	Nearly equal to blood	Nearly equal to blood	Often lower than blood	Often >25 mg/100 mL lower than blood

a. Very recent effusions do not give firm clot because of serum admixture.

Source: Leversee, JH. Aspiration of joints and soft tissue injections. See: *Primary Care* 1986; 13(3):579-99. McCarty, Jr. DJ. The differential diagnosis of arthritis. *Med Times* 1964; 92:1167.

Corgard (Nadolol) tablets

Therapeutic classification

ANTIANGINAL AND

ANTIHYPERTENSIVE AGENT

INDICATIONS:

Angina: For prophylaxis of angina pectoris.

Hypertension: In patients with mild or moderate hypertension. Usually used in combination with other drugs, particularly a thiazide diuretic, however, may be tried alone as an initial agent in those patients whose treatment should be started with a beta-blocker rather than a diuretic.

The combination of CORGARD with a diuretic has been found to be compatible and generally more effective than CORGARD alone. No evidence of incompatibility was seen when peripheral vasodilators were used with CORGARD.

Not recommended for the emergency treatment of hypertensive crises.

CONTRAINDICATIONS:

Allergic, rhinitis, bronchospasm (including bronchial asthma), or severe chronic obstructive pulmonary disease (see PRECAUTIONS); sinus bradycardia; second and third degree A-V block; right ventricular failure secondary to pulmonary hypertension; congestive heart failure (see WARNINGS); cardiogenic shock; anesthesia with agents that produce myocardial depression, e.g. ether.

WARNINGS:

Cardiac Failure: Special caution should be exercised when administering CORGARD to patients with a history of heart failure, since inhibition with beta-blockade always carries a potential hazard of further depressing myocardial contractility and precipitating cardiac failure. In patients without a history of cardiac failure, continued depression of the myocardium can lead to cardiac failure. Therefore, at the first sign or symptom of impending cardiac failure, patients should be digitalized, and/or given a diuretic, and observed closely.

CORGARD does not block the inotropic action of digitalis on the heart muscle, however, the positive inotropic action of digitalis may be reduced by the negative inotropic effect of CORGARD when the two drugs are used concomitantly. The effects of CORGARD and digitalis are additive in depressing A-V conduction. If cardiac failure continues, discontinue CORGARD therapy (see WARNING below).

Abrupt Cessation of Therapy with CORGARD: Warn patients with angina against abrupt discontinuation. There have been reports of severe exacerbation of angina, and of myocardial infarction or ventricular arrhythmias in patients with angina, following abrupt discontinuation of beta-blocker therapy. The last two complications may occur with or without preceding exacerbation of angina pectoris. Therefore, when discontinuation of CORGARD is planned in patients with angina, dosage should be gradually reduced over a period of about 2 weeks and the patient carefully observed. The same frequency of administration should be maintained. In situations of greater urgency, CORGARD therapy should be discontinued stepwise and under conditions of closer observation. If angina markedly worsens or acute coronary insufficiency develops, it is recommended that treatment with CORGARD be reinstituted promptly, at least temporarily.

Various skin rashes and conjunctival xerosis have been reported. A severe syndrome (oculo-muco-cutaneous syndrome), whose signs include conjunctivitis sicca and psoriasiform rashes, otitis and sclerosing serositis, has occurred with the chronic use of one beta-adrenergic-blocking agent (practolol), but has not been observed with CORGARD or any other such agent. Physicians should be alert to the possibility of such reactions and should discontinue treatment in the event that they occur.

Severe sinus bradycardia due to unopposed vagal activity occurs in approximately 3% of patients following administration of CORGARD. In such cases, dosage should be reduced or the use of intravenous atropine and, if necessary, isoproterenol should be considered.

In patients with thyrotoxicosis, CORGARD may diminish peripheral manifestations of hyperthyroidism without improving thyroid function; therefore abrupt withdrawal may be followed by exacerbation of symptoms of hyperthyroidism, including thyroid storm.

PRECAUTIONS:

CORGARD should be administered with caution to patients subject to spontaneous hypoglycemia, or to diabetic patients (especially those with labile diabetes) who are receiving insulin or oral hypoglycemic agents. Beta-adrenergic blockers may mask the premonitory signs and symptoms of acute hypoglycemia. As beta-blockade also reduces the release of insulin in response to hyperglycemia, it may be necessary to adjust the dosage of antidiabetic drugs.

CORGARD dosage should be individually adjusted when used concomitantly with other antihypertensive agents (see DOSAGE AND ADMINISTRATION).

Closely monitor patients also receiving catecholamine-depleting drugs, such as reserpine and guanethidine. The added catecholamine blocking action of CORGARD may produce an excessive reduction of the resting sympathetic nervous activity.

Suitable laboratory tests should be made and caution observed in patients with impaired renal or hepatic function. Since CORGARD is excreted mainly by the kidneys, dosage reduction may be necessary when renal insufficiency is present.

In Patients with Angina Undergoing Elective Surgery: CORGARD should be withdrawn gradually following recommendation given under Abrupt Cessation of Therapy (see WARNINGS). Available evidence suggests that the clinical and physiologic effects of beta-blockage induced by CORGARD are essentially absent 5 days after cessation of therapy.

In emergency surgery, effects of CORGARD may be reversed, if necessary, by sufficient doses of such agonists as isoproterenol or levaterenol.

Usage in Pregnancy and Nursing Mothers: Since CORGARD has not been studied in human pregnancy, it should not be given to pregnant women. Use of any drug in patients of childbearing potential requires that the anticipated benefit be weighed against possible hazards.

When given to pregnant rats, nadolol readily crossed the placental barrier, and was also found in milk of lactating rats. Information in humans is lacking; therefore, use of this drug in lactating women is not recommended.

Usage in Children: There is no experience with CORGARD in the treatment of pediatric age groups.

ADVERSE REACTIONS:

The most serious adverse reactions encountered are congestive heart failure, A-V block and bronchospasm.

The most common adverse reactions reported are severe bradycardia (3%), dizziness (3%), fatigue (2%), hypotension (1%), congestive heart failure (1%), and cold sensations (1%).

Cardiovascular: Congestive heart failure, pulmonary edema, cardiac enlargement; rhythm or conduction disturbances including A-V block, bigeminy and Adams-Stokes syndrome; chest pain; severe bradycardia; hypotension; orthostatic hypotension, syncope; peripheral vascular insufficiency including intermittent claudication and cold extremities; edema.

Respiratory: Bronchospasm, dyspnea, cough.

Central Nervous System: Dizziness, depression, anxiety, nervousness, irritability, hallucinations; lethargy, fatigue. Sleep disturbances including insomnia and nightmares, paresthesia, headache, tinnitus, slurred speech.

Gastrointestinal: Abdominal pain or pressure, nausea, vomiting, diarrhea, constipation, flatulence, gastritis, anorexia.

Dermatological (see WARNINGS): Rash, pruritus, dry skin.

Ophthalmologic: Conjunctivitis, blurred vision, dry eyes.

Miscellaneous: Impotence, decreased libido, enlarged thyroid, nasal stuffiness, dry mouth, sweating, weight gain.

Clinical Laboratory: Most frequently been found to be outside the normal range: serum triglycerides, blood glucose, serum potassium, SGOT, SGPT, LDH, BUN.

DOSAGE AND ADMINISTRATION:

It is recommended that CORGARD be administered as a single daily dose. CORGARD may be administered without regard to meals.

CORGARD dosage must always be adjusted to the individual needs of the patients, in accordance with the following guidelines:

Angina Pectoris: Initiate treatment with doses of 80 mg daily. After one week, dosage may be increased by 80 mg increments at weekly intervals, until a satisfactory response is achieved. The maximum recommended daily dose is 240 mg. Patients stabilized on 80 mg daily might be tried on 40 mg daily as this dose has been found to be effective in some cases.

Hypertension: Initiate treatment with doses of 80 mg daily. After one week, dosage may be increased by 80 mg increments at weekly intervals, until a satisfactory response is achieved. The maximum recommended daily dose is 320 mg, although most patients respond to 240 mg or less.

AVAILABILITY:

Each white, round, biconvex tablet, scored on one side and engraved with "Corgard 40" on the other, contains 40 mg of nadolol. Each white, round, biconvex tablet, scored with a partial bisect bar and engraved with "Squibb" on one side, and "Corgard 80" on the other, contains 80 mg of nadolol. Each blue, flat, capsule-shaped tablet, scored on both sides with a partial bisect and engraved with "Squibb" on one side and "Corgard 160" on the other, contains 160 mg of nadolol.

CORGARD 40 mg, 80 mg and 160 mg are available in bottles of 100 tablets and in blister packs of 28 tablets.

Store tightly closed at room temperature. Protect from heat, light and moisture.

Product monograph available on request.

brief crystal-induced arthritis 12-24 hours after injection of steroid, when this is considered necessary.

Arthrocentesis is a mandatory procedure to prove beyond reasonable doubt that infection is not the cause of the arthritis. The family physician must become familiar with this procedure and obtain fluid for analysis or refer, as discussed, when joint fluid cannot be readily aspirated. ●

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